U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGICAL CENTER

OFFICE NOTE 305

Precipitation Verification 1984

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JANUARY 1985

FORECAST BRANCH

SHORT RANGE
(1-2 Day)

PRECIPITATION VERIFICATION
1984

INTRODUCTION

The Forecast Branch, Short Range (1-2 day) forecast unit, keeps a continuous record of precipitation threat scores, no precipitation threat scores and Bias. These scores are used to evaluate the effectiveness of the 1-2 day operational meteorologist, and the guidance, in precipitation situations.

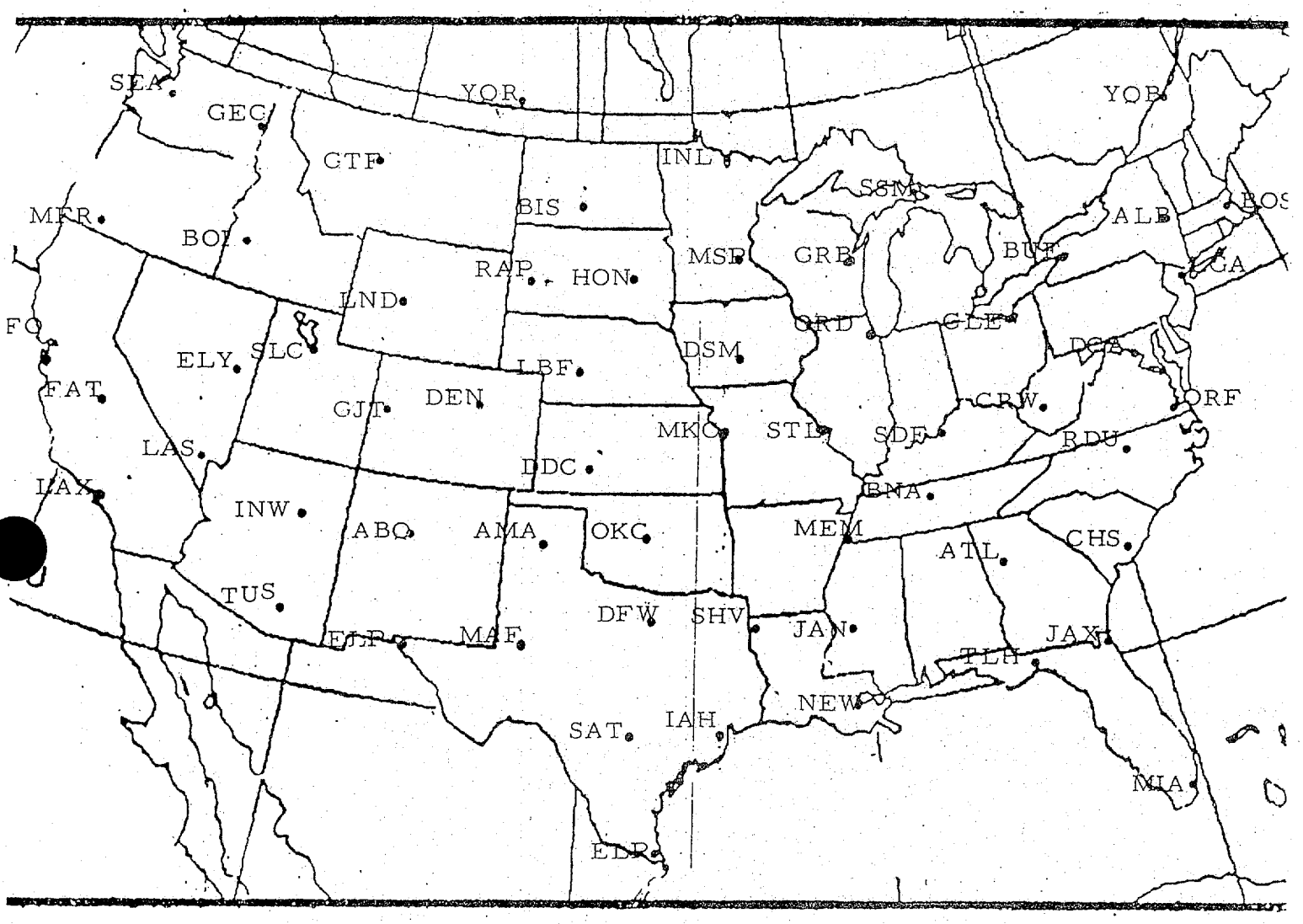
Attached is the precipitation verification for 1984. The results cover a 60 station network (Fig. 1) and are divided into 24-12 and 36-12 hour periods. In Fig. 2 TsP, TsNP and Bias statistics for the two forecast periods are listed from January through December 1984, under three main categories; Forecast Branch scores, LFM scores and PoP scores. New records for the month are indicated by an asterisk. Records are not listed for PoPs but one can easily make comparisons.

The operational forecaster still has an edge over the LFM and the PoPs. "How much" is shown as percentage improvement = $\frac{FB-LFM}{LFM}$ near the bottom of Fig. 2. The results show the 1-2 day forecaster continuing to improve the LFM precipitation guidance significantly. At 24-12 and 36-12 hrs, improvement of 14.7% and 12.7% for threat score and 13.6% and 18.9% for Bias is significant. Even more significant is the comparisons of the 36-12 hr, 1-2 day TsP and the 24-12 hr LFM TsP. Here the operational forecaster records a 12-hr edge on the LFM and the PoPs. Nine out of 12 months the 1-2 day 36-12 hr TsP was better (see Fig. 3) than the 24-12 hr LFM TsP, and 8 out of 12 months the 36-12 hr, 1-2 day TsP score was better than the 24-12 hr TsP PoPs scores. Of course, the PoPs scores are the worst from June through August, but all the scores drop off in the summer. The PoPs just happen to drop off the most.

The PoPs continue to be low scoring on the average except for TsNP which is usually the highest scores at both 36-12 hrs and 24-12 hrs. The operational forecaster however, should be careful and not discount the PoPs (45% probability or greater) picks. With low bias, many times way below 1.00, the PoPs still have reasonably good TsP scores and show skill for stations or areas depicted.

Figs. 4 and 5 show a month-by-month comparison of TsP at 36-12 hrs and 24-12 hrs between the LFM, PoPs and 1-2 day operational forecasters. Not too much additional information available here. The operational forecasters (1-2 day) continue to demonstrate the most skill and the PoPs the least skill.

Finally, Figs. 6 and 7 show a continuous year-by-year comparison of LFM vs BWB (FB since July 84) TsP and Bias. The comparisons indicate the LFM Bias continues to diminish since peak highs in 1982 and the TsP shows a 3-year low at 24-12 hrs for FB and a 5-year low for the LFM. At 36-12 hrs the Bias drops to a 2-year low for both the LFM and FB but the TsP scores moved to an all time high for FB by almost 2.5 points and for the LFM by about 1 point. Forecast Branch's 1-2 day unit continues to show outstanding TsP and low Bias comparisons.



60 STATION NETWORK

Fig #1

Fig#2

Precipitat[illegible]Verification

	36-12Hrs									24-12Hrs								
	LFM			FB			POPS			LFM			FB			POPS		
	TsP	TsNP	BIAS	TsP	TsNP	BIAS	TsP	TsNP	BIAS	TsP	TsNP	BIAS	TsP	TsNP	BIAS	TsP	TsNP	BIAS
Jan	37.35	80.84	1.22	42.03	84.45	1.04	33.55	85.47	.61	42.58	84.43	1.05	48.04	86.82	.99	41.05	87.00	.70
Feb	41.42	79.80	1.41	47.03*	83.53	1.24	42.98	86.40	.77	46.94	83.80	1.27	53.87	86.30	1.21	49.51	87:59	.85
Mar	46.00*	77.63	1.45	49.64	82.47	1.17	47.19	85.71	.76	51.06*	82.09	1.35	56.44*	85.28	1.17	50.23	85.75	.86
Apr	43.05*	74.39	1.59	46.60	80.04	1.28	44.50	84.54	.84	44.18	75.86	1.59	52.55	82.41	1.31	50.16	84.66	.94
May	37.56	74.36	1.58	41.43	79.96	1.27	36.64	83.19	.74	41.82	77.75	1.48	45.96	81.74	1.28	40.25	85.18	.69
Jun	27.92	72.95	1.45	31.56	77.46	1.21	17.53	81.45	.49	31.48	75.03	1.42	35.89	78.42	1.30	25.29	84.46	.46
Jul	29.06	75.17	1.43	32.71	79.91	1.14	24.71	84.81	.42	30.55	76.52	1.38	35.62	80.46	1.20	28.40	85.50	.46
Aug	24.89	74.52	1.36	28.80	78.24	1.19	12.74	83.32	.27	27.17	75.54	1.38	32.62	78.48	1.32	16.52	83.14	.37
Sep	28.88	76.14	1.58	34.71	82.28	1.18	25.12	85.44	.54	34.10	79.24	1.52	40.68	84.45	1.18	30.81	86.66	.58
Oct	37.25	69.79	1.64	41.64	76.82	1.28	36.24	81.13	.74	41.36	73.88	1.53	46.60	79.35	1.27	40.68	82.28	.87
Nov	40.23	76.13	1.75	46.90	83.33	1.25	42.04	86.07	.77	45.71	81.13	1.52	54.53	86.92	1.15	49.72	87.92	.83
Dec	40.15	75.39	1.31	43.78	79.70	1.09	36.59	82.51	.60	43.38	77.50	1.30	48.04	81.42	1.11	44.11	84.67	.68
Yearly Avg.	38.36	75.59	1.48	43.95	80.68	1.20	33.32	84.17	.62	40.03	78.56	1.40	45.90	82.67	1.21	38.89	85.40	.69

$\frac{FB-LFM}{LFM}$ = % IMP OVER LFM 12.7% 6.7% 18.9%; POPS 31.9% 93 % 4.1%

$\frac{FB-LFM}{LFM}$ = % IMP OVER LFM 14.7% 5.2% 13.6 %; POPS 18.0% 75.4 % 3.2%

$TsP = \frac{H}{F+O-H}$

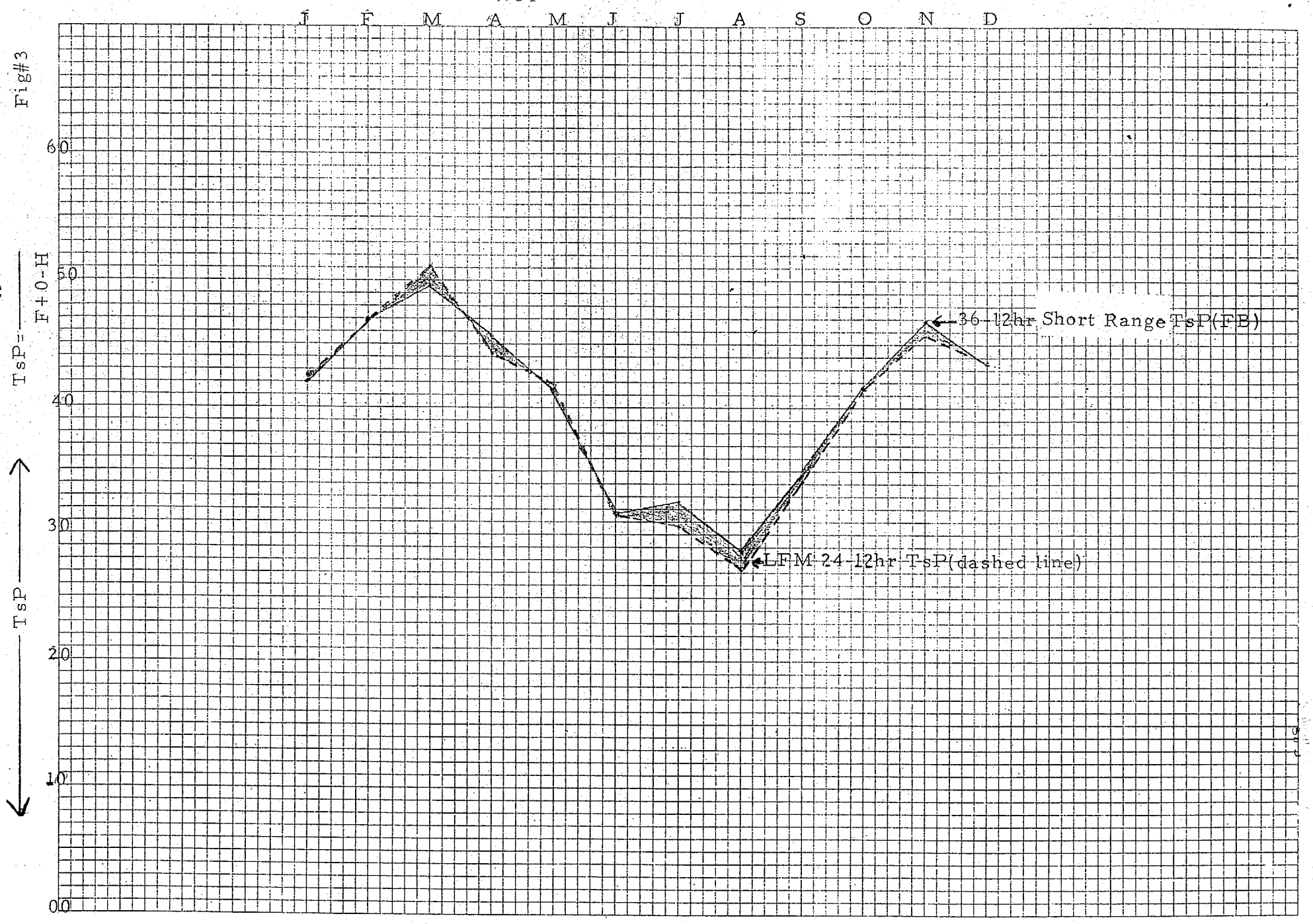
"For POPS" F = a forecast of 45% probability or greater of .01/12 hr period in the 60 station network

$Bias = \frac{F}{O}$

*New TsP records for the month

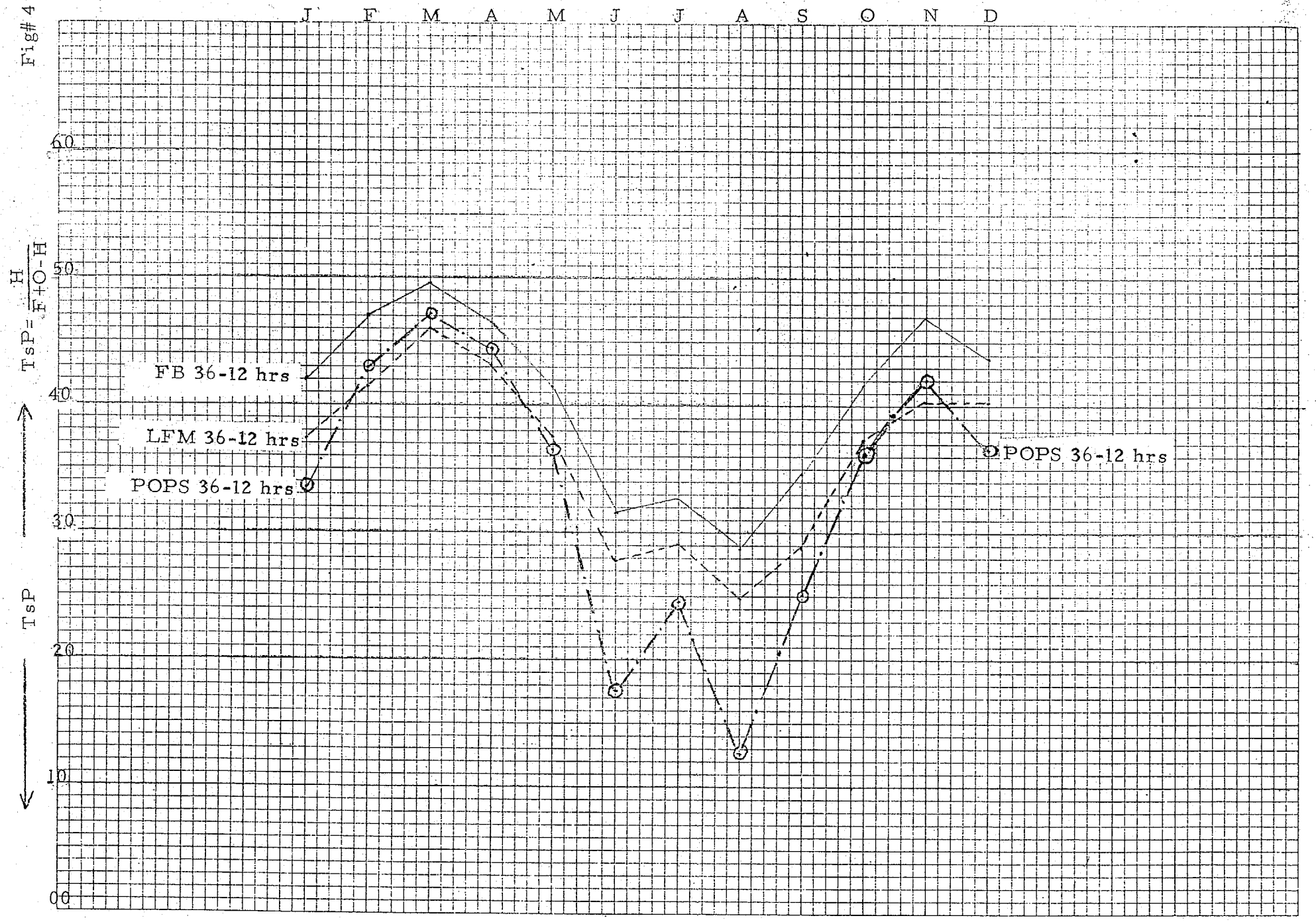
$TsNP = \frac{*N-(F+O-H)}{*N-H}$ (*N) number of reports over 60 station network for 12-hr period
ex. there are 62(12hr) reporting periods in a 31 day month 62X60= 3720 for *N

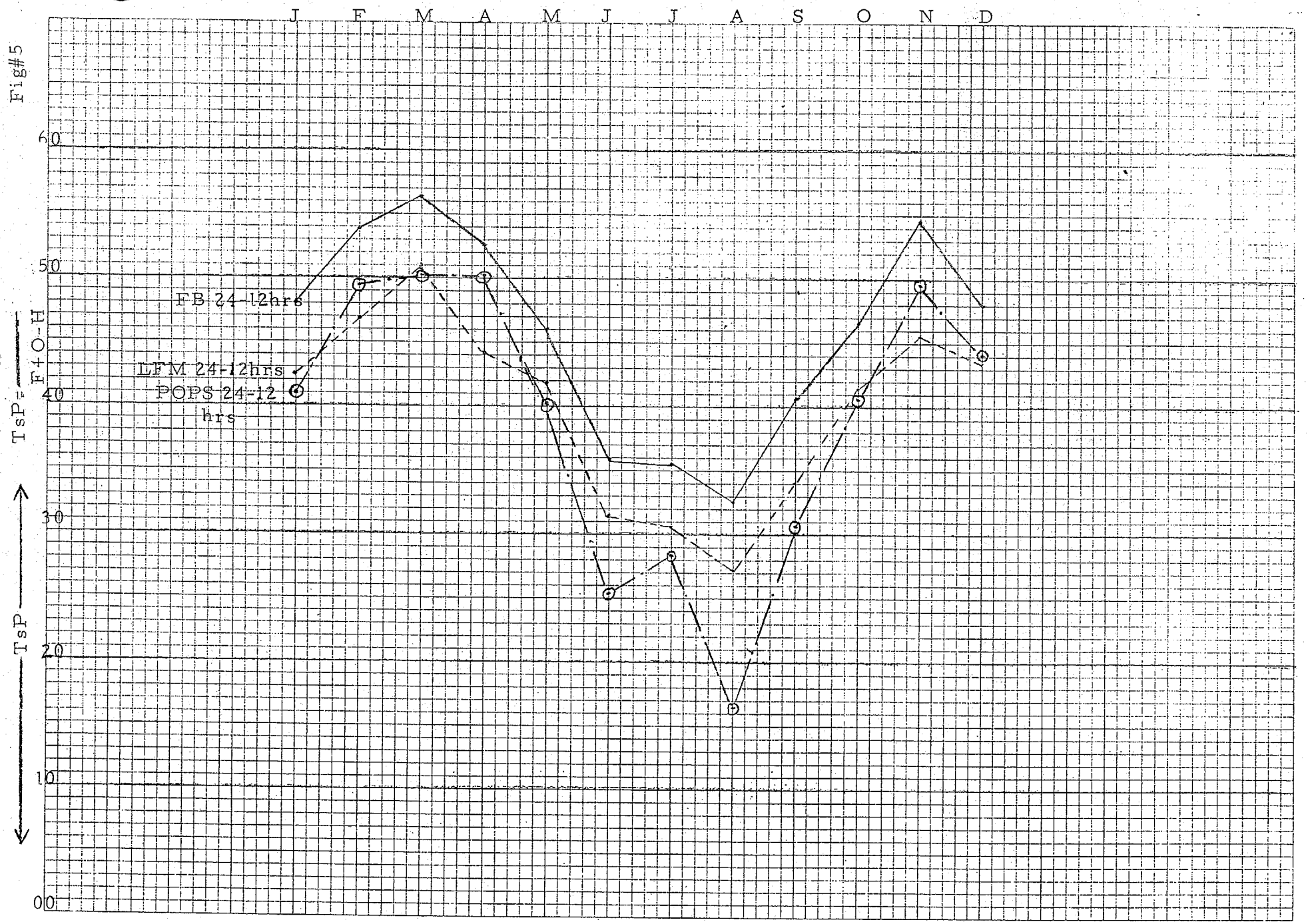
For purposes of statistical evaluation 1.20 is considered a near perfect forecast Bias.


LFM 24-12hr vs FB 36-12hr
Jan-Dec
1984
J F M A M J J A S O N D
Fig#3
TsP=
F+0-H
H
TsP
60
50
40
30
20
10
00
36-12hr Short Range TsP(FB)
LFM 24-12hr TsP(dashed line)

1984

Fig# 4


J F M A M J J A S O N D
60
50
40
30
20
10
00
TsP = H / F+O-H
TsP
FB 36-12 hrs
LFM 36-12 hrs
POPS 36-12 hrs
POPS 36-12 hrs


Fig#5
J F M A M J J A S O N D
60
50
40
30
20
10
00
FB 24-12hrs
LFM 24-12hrs
POPS 24-12 hrs
TsP = F+O-H
H
TsP

Fig#6

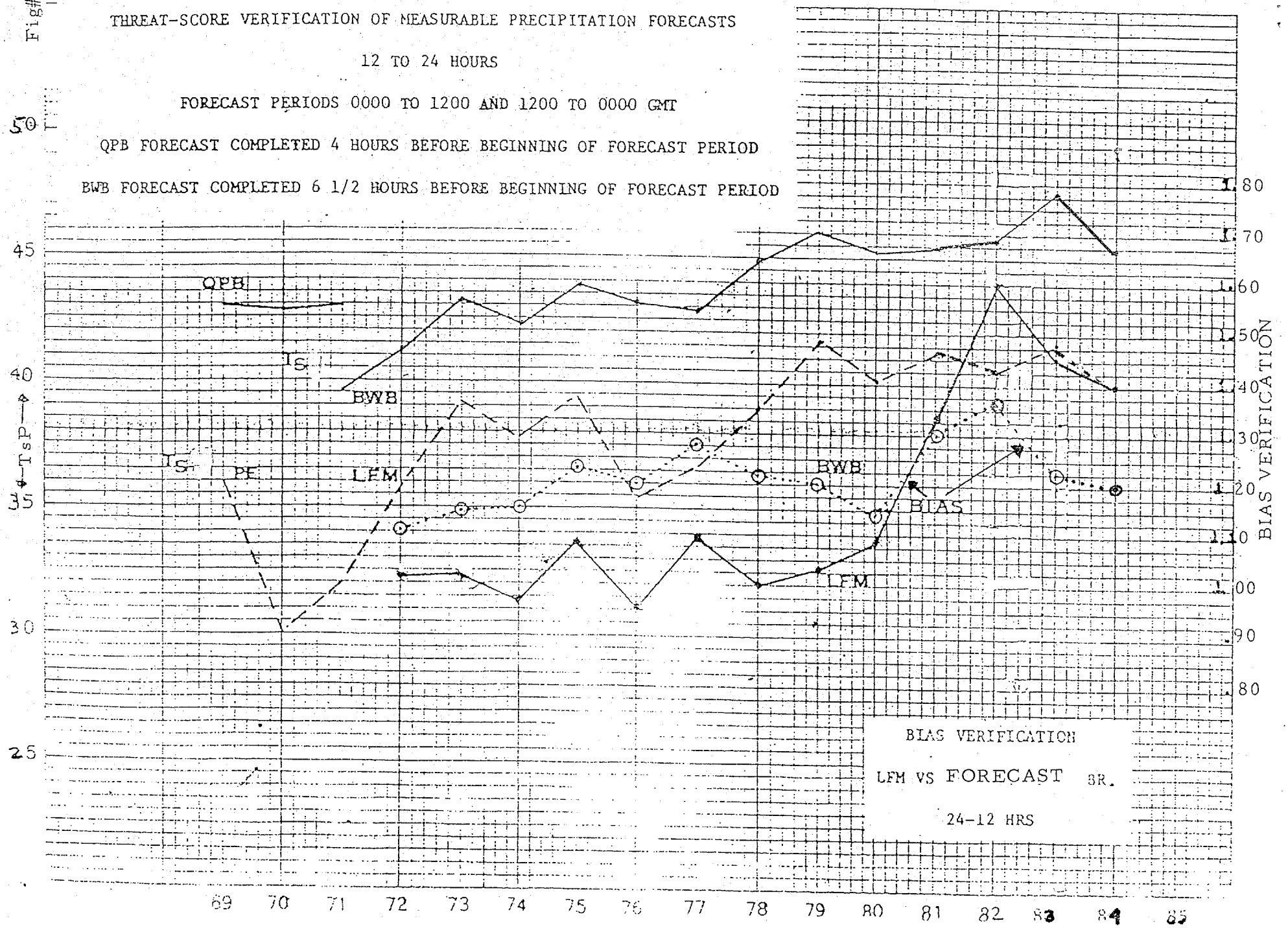
THREAT-SCORE VERIFICATION OF MEASURABLE PRECIPITATION FORECASTS

12 TO 24 HOURS

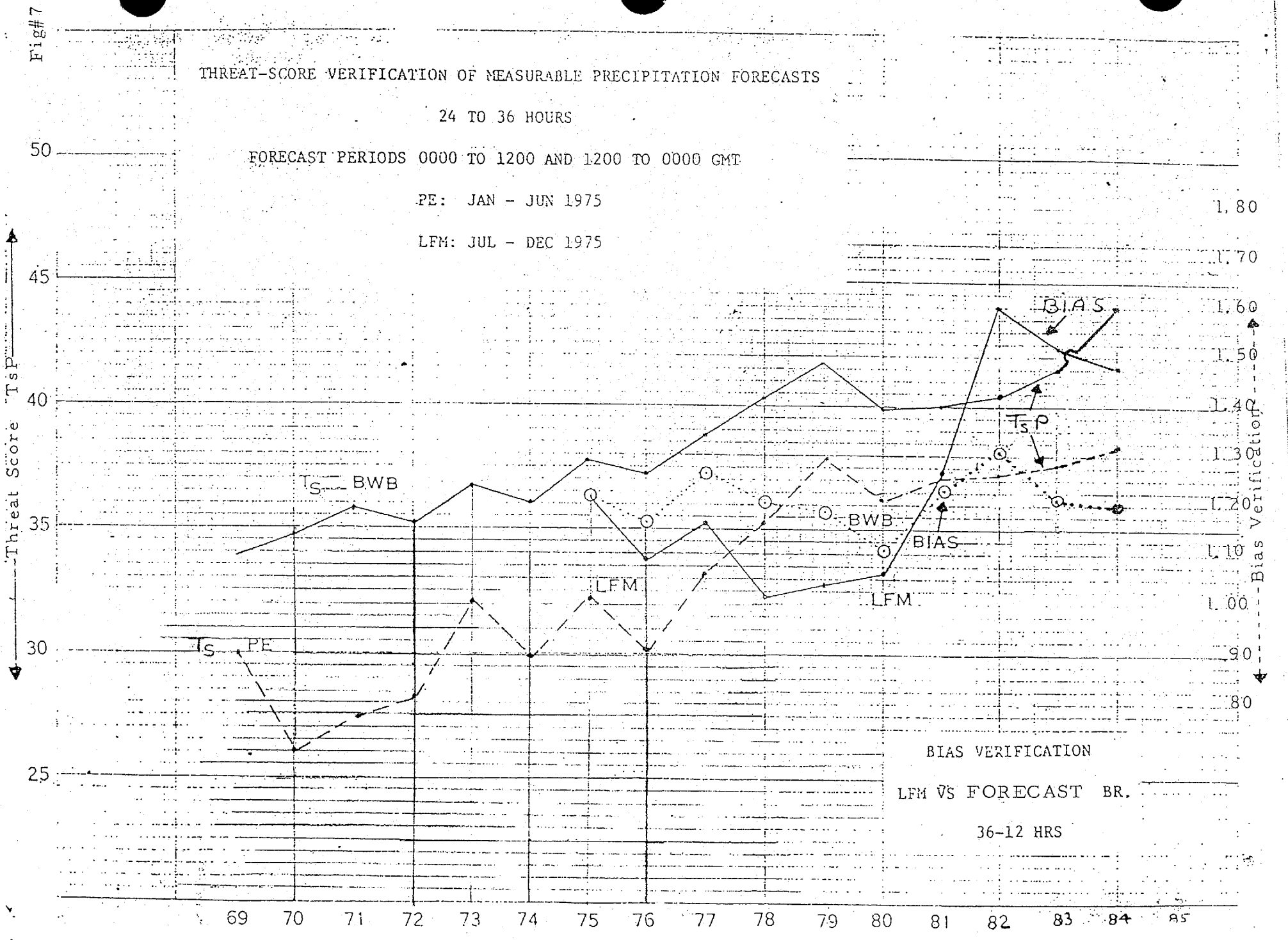
FORECAST PERIODS 0000 TO 1200 AND 1200 TO 0000 GMT

QPB FORECAST COMPLETED 4 HOURS BEFORE BEGINNING OF FORECAST PERIOD

BWB FORECAST COMPLETED 6 1/2 HOURS BEFORE BEGINNING OF FORECAST PERIOD



Fig#7


THREAT-SCORE VERIFICATION OF MEASURABLE PRECIPITATION FORECASTS
24 TO 36 HOURS
FORECAST PERIODS 0000 TO 1200 AND 1200 TO 0000 GMT
PE: JAN - JUN 1975
LFM: JUL - DEC 1975
Threat Score TsP
Bias Verification
50
45
40
35
30
25
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
BIAS
TsP
TS BWB
BWB
BIAS
LFM
LFM
TS PE
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
BIAS VERIFICATION
LFM VS FORECAST BR.
36-12 HRS